

### 10-1: Solving Proportions

**Learning Target:** I can identify and solve proportional relationships.

- A **PROPORTION** is an equation that shows two ratios are equal. (FRACTION)
- In order to be proportional, the two ratios must have the same Cross-products (fractions)

**Exercise 1 - Determine if the following ratios are proportional (equivalent fractions).**

(1)  $\frac{4}{9} = \frac{8}{18}$    
 $72 = 72$  **yes!**  
 $\frac{4}{9} = \frac{4}{9}$  **yes!**

(2)  $\frac{9}{10} = \frac{3}{4}$    
 $30 \neq 36$   
 Not proportional

(3)  $\frac{3}{5} = \frac{6}{10}$    
 $30 = 30$   
 yes!  
 proportional  
 and  
 equivalent  
 fraction.

**Exercise 2 - Proportions and cross products can also be used to solve problems.**

(4)  $\frac{n}{8} = \frac{12}{16}$    
 $\frac{16n}{16} = \frac{96}{16}$   
 $n = 6$

(5)  $\frac{3}{k} = \frac{5}{15}$    
 $5k = 45$   
 $k = 9$

(6)  $\frac{18}{30} = \frac{y}{4}$    
 $\frac{30y}{30} = \frac{72}{30}$   
 $y = 2.4$

(7)  $\frac{2.8}{4} = \frac{7}{x}$    
 $2.8x + 2.8$   
 $2.8$   $2.8$   
 $x = 10$

(8)  $\frac{8}{20} = \frac{30}{c}$    
 $\frac{8c}{8} = \frac{600}{8}$   
 $c = 75$

(9)  $\frac{24}{n} = \frac{30}{100}$

**Exercise 3 - Sometimes, there will be more complex proportions with algebraic expressions.**

(10)  $\frac{x+3}{4} = \frac{7}{8}$    
 $8(x+3) = 28$   
 $8x + 24 = 28$   
 $-24$   $-24$   
 $8x = 4$   
 $\frac{8x}{8} = \frac{4}{8}$   
 $x = 0.5$

(11)  $\frac{8}{b+10} = \frac{4}{2b-7}$    
 $8(2b-7) = 4(b+10)$   
 $16b - 56 = 4b + 40$   
 $-4b$   $-4b$   
 $12b - 56 = 40$   
 $+56$   $+56$   
 $12b = 96$   
 $\frac{12b}{12} = \frac{96}{12}$   
 $b = 8$

**Problem Set:** Solve each proportion for the value of the variable. Round to the nearest hundredth if needed.

<p>(1) <math>\frac{n}{2} = \frac{1}{11}</math></p> $11n = 2$ $n = 0.18$	<p>(2) <math>\frac{5}{y} = \frac{7}{5}</math></p> $7y = 25$ $y = 3.571$ $y = 3.57$	<p>(3) <math>\frac{2v+15}{5} = \frac{1}{2}</math></p> $2(2v+15) = 5$ $4v + 30 = 5$ $-30 \quad -30$ $\frac{4v}{4} = \frac{-25}{4}$ $v = -6.25$
<p>(4) <math>\frac{1}{8} = \frac{27}{c-25}</math></p> $216 = 1(c-25)$ $216 = 1c - 25$ $+25 \quad +25$ $\frac{241 = 1c}{1 \quad 1}$ $241 = c$	<p>(5) <math>\frac{a}{2} = \frac{a-27}{3}</math></p> $2(a-27) = 3a$ $2a - 54 = 3a$ $-2a \quad -2a$ $\frac{-54 = a}{1 \quad 1}$ $-54 = a$	<p>(6) <math>\frac{8}{6} = \frac{n+2}{n}</math></p> $8n = 6(n+2)$ $8n = 6n + 12$ $-6n \quad -6n$ $\frac{2n}{2} = \frac{12}{2}$ $n = 6$
<p>(7) <math>\frac{3}{7} = \frac{v+9}{v}</math></p> $3v = 7v + 63$ $-7v \quad -7v$ $\frac{-4v = 63}{-4 \quad -4}$ $v = -15.75$	<p>(8) <math>\frac{4}{k} = \frac{8}{k-1}</math></p>	<p>(9) <math>\frac{4}{3} = \frac{6r}{r-8}</math></p>

(10) The money used in South Africa is called the Rand. Ms. Moser wants to go on an African safari. She brings \$500 on her vacation for spending money. If the exchange rate is 7 Rand for \$1, how many Rand does Ms. Moser have?